

EXHIBIT F

Hawley's
**CONDENSED
CHEMICAL
DICTIONARY**

Eleventh Edition



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bp 400C, miscible in water and xylene, slightly soluble in kerosene and diesel fuel. Commercially available water-miscible solution.

Hazard: Cholinesterase inhibitor. TLV: 0.25 mg/m³ of air. Toxic by skin absorption.

Use: Insecticide.

biformin. $C_9H_8O_2$. An antibiotic produced by the fungus *Polyporus biformis*, reported to be active against various bacteria and fungi.

Biginelli reaction. Synthesis of tetrahydropyrimidinones by the acid catalyzed condensation of an aldehyde, a beta-keto ester, and urea.

"B-I-K."²⁴⁸ TM for a surface-coated urea.

Properties: White powder, d 1.32, melting range 129-134C, soluble in water. Surface coating not soluble in water but is soluble in rubber. Slightly soluble in acetone, insoluble in benzene, gasoline and ethylene dichloride.

Use: Promoter for azodicarbonamide, a nitrogen blowing agent; activator for thiazoles, sulfenamides, and thiurams; odor reducer when used with nitrosoamine-type blowing agents.

"Bikalith."²⁸⁸ TM for a series of lithium silicate ores including lepidolite, petalite, spodumene, and eucryptite.

Used in glass-making and ceramics.

bile acid. An acid found in bile (secretion of the liver): Bile acids are steroids having a hydroxyl group and a five carbon atom side chain terminating in a carboxyl group. Cholic acid is the most abundant bile acid in human bile. Others are deoxycholic and lithocholic acids. The bile acids do not occur free in bile but are linked to the amino acids, glycine and taurine. These conjugated acids are water-soluble. Their salts are powerful detergents and as such aid in the absorption of fats from the intestine.

bilirubin. (bilifulvin). $C_{33}H_{36}O_6N_4$.

Red coloring matter of bile. Also occurs in blood serum as decomposition product of hemoglobin.

Properties: Orange-red powder; mp 192C; soluble in acids, alkalis, chloroform, and benzene; insoluble in water; very slightly soluble in alcohol and ether.

Derivation: From bile pigment.

Use: Analytical chemistry, biochemical research.

bimetal. A type of thermometer in which the sensing element consists of two thin strips of metals having different expansion coefficients bonded together in a helical or spiral structure. The extent of deflection or bending induced by tempera-

ture change is indicated by a pointer on a dial. Reasonably accurate readings are obtained in this way, the range being from -185 to 425C. Bi-metals are used in both laboratory and industry. See also thermometer.

binapacryl. Generic name for 2-sec-butyl-4,6-dinitrophenyl-3-methyl-2-butenolate.

$C_{15}H_{18}O_6N_2$.

Hazard: Toxic by ingestion and inhalation.

Use: Acaricide and fungicide.

binary. Descriptive of a system containing two and only two components. Such a system may be a chemical compound composed of two elements an element and a group (hydroxyl, methyl, etc.) or two groups, e.g., oxalic acid, it may also be a two-component solution or alloy.

bind. To exert a strong physiochemical attraction as often occurs between various proteins and water in hydrophilic gels, between organic dyes and fabrics, or between acids or bases and various chemical complexes.

binder. (1) The film-forming ingredient in paint, usually either a drying oil or a polymeric substance.

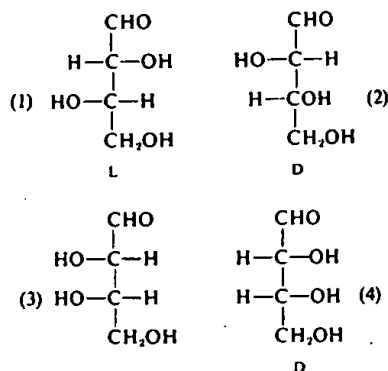
See also paint.

(2) In the food industry a material used in sausage manufacture that absorbs moisture at high temperatures, e.g., various flours, dried milk and soy protein.

(3) Any cementitious material that is soft at high temperatures and hard at room temperature used to hold dry powders or aggregate together, e.g., asphalt and sulfur in paving compositions and resins used in sand-casting.

binding energy. The energy that holds the protons together in an atomic nucleus. Since protons are positively charged, they exert strong mutually repellant forces and tremendous energy is required to keep them from flying apart. This energy is so great that it results in a slightly lower value for the mass of a nucleus taken as a whole than for the sum of its constituents taken individually. This phenomenon is of vast significance, for it means that a small fraction of mass has been converted into energy within the nucleus, as shown by Einstein's equivalence equation $E = mc^2$. Thus, when a U-235 nucleus (92 protons) is split as in the fission process a portion of its binding energy (equivalent to the mass difference) is released. It amounts to approximately 200 million electron volts per nucleus.

Binding energy may also be defined as the minimum energy required to dissociate a nucleus



See also optical isomer, enantiomer, epimer, anomer.

diatomaceous earth. (diatomite; kieselguhr; infusorial earth).

Properties: Soft, bulky, solid material (88% silica) composed of skeletons of small prehistoric aquatic plants related to algae (diatoms). They have intricate geometric forms. Available as light-colored blocks, bricks, powder, etc. True d 1.9-2.35, bulk density from 5-15 lb/cubic ft. Insoluble in acids except hydrogen fluoride, soluble in strong alkalis. Absorbs 1.5-4 times its weight of water, also has high oil absorption capacity. Poor conductor of sound, heat, and electricity. Noncombustible.

Occurrence: Western US, Europe, Algeria, USSR. Grade: Natural, chemical, airfloats.

Hazard: Inhalation of dust.

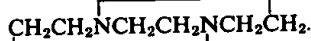
Use: Filtration, clarifying and decolorizing; insulation; absorbent; mild abrasive; drilling mud thickener; extender in paints, rubber, and plastic products; ceramics; paper coating; anticaking agent in fertilizers; asphalt compositions; chromatography; refractories; acid-proof liners; catalyst carrier.

diatomic. Descriptive of a gas whose molecules are composed of two atoms, e.g., O₂, N₂, Cl₂, H₂. Gases in which the element is present as single atoms are called monatomic, e.g., Ar, Ne.

diatomite. See diatomaceous earth.

diatrizoate sodium. See sodium diatrizoate.

1,4-diazabicyclo[2.2.2]octane.



Properties: Crystals, hygroscopic, mp 158C, bp 174C, forms crystalline hydrate, sublimes easily, soluble in water and organic solvents.

Use: Possible catalyst for urethane foams and coatings, chemical intermediate.

diazepam. USAN for 7-chloro-1,3-dihydro-1-methyl-5-phenyl-2H-1,4-benzodiazepin-2-one. CAS: 439-14-5. C₁₆H₁₃ClN₂O.

Properties: Slightly yellowish, crystalline powder; practically no odor; mp 131.5-134.5C. One gram of diazepam dissolves in about 350 mL of water, in approximately 15 mL of 95% ethanol, or in approximately 2 mL of chloroform.

Hazard: Central nervous system depressant. Addictive. Manufacture and usage restricted.

Use: Medicine (tranquilizer).

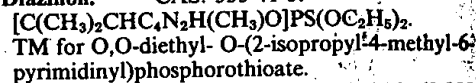
"Diazine."²⁴³ TM for a group of direct dyes, applied to cotton, diazotized, and then coupled onto phenols or amines.

1,3-diazine. (pyrimidine; miazine).



Properties: Liquid or crystalline mass with a penetrating odor, mp 20-22C, bp 123-124C. Soluble in water, alcohol, and ether. See also pyrimidine.

"Diazinon."⁵⁹³ CAS: 333-41-5.



Properties: Colorless liquid; bp 83-84C (0.002 mm); slightly soluble in water; freely soluble in petroleum solvents, alcohol, and ketones. More stable in alkaline than neutral or acid solutions.

Hazard: Toxic by ingestion, inhalation, and skin absorption. Cholinesterase inhibitor. Use may be restricted. TLV: 0.1 mg/m³ of air.

Use: Insecticide (use against fire ants permitted by EPA).

diazoaminobenzene. (1,3-diphenyltriazene; benzeneazoanilide). CAS: 136-35-6. C₆H₅NNNHC₆H₅.

Properties: Golden-yellow scales. Soluble in alcohol, ether, and benzene; insoluble in water; mp 96C.

Derivation: Interactions of nitrous acid and an alcoholic solution of aniline.

Hazard: Explodes on heating to 150C. Dangerous. Use: Organic synthesis, dyes, insecticide.

p-diazobenzenesulfonic acid. C₆H₄SO₃N₂.

Properties: White or slightly red crystals or white paste. Soluble in water and ether, insoluble in alcohol.

Derivation: From sulfanilic acid, sodium nitrite, and sulfuric acid.

resin, ion-exchange. See ion-exchange resin.

resin, liquid. An organic polymeric liquid which, when converted to its final state for use, becomes solid (ASTM). Example linseed oil, raw or heat-bodied (partially polymerized).
See also drying oil, resinoid.

resin, natural. (a) Vegetable-derived, amorphous mixture of carboxylic acids, essential oils, and terpenes occurring as exudations on the bark of many varieties of trees and shrubs. They are combustible, electrically nonconductive, hard and glassy with conchoidal fracture when cold, and soft and sticky below the glass transition point. Most are soluble in alcohols, ethers and carbon disulfide, and insoluble in water. The best known of these are rosin and balsam, obtained from coniferous trees; these have a high acid content. Of more remote origin are such resins as kauri, congo, dammar, mastic, sandrac, and copal. Their use in varnishes, adhesives and printing inks is still considerable, though diminishing in favor of synthetic products. (b) Miscellaneous types. Shellac, obtained from the secretion of an Indian insect, is still in general use as a transparent coating. Amber is a hard, polymerized resin that occurs as a fossil. Ester gum is a modified rosin. Amorphous sulfur is considered an inorganic natural resin. Liquid resins, sometimes called resinoids, are represented by linseed and similar drying oils.

See also gum, natural (note); resin, synthetic (note).

resinoid. Any thermosetting synthetic resin, either in its initial temporarily fusible state or its final infusible state (ASTM). Heat-bodied linseed oil, partially condensed phenol-formaldehyde and the like, are also considered resinoids.

resinol. A coal-tar distillation fraction containing phenols. It is the fraction soluble in benzene but insoluble in light petroleum, obtained by solvent extraction of low temperature tars or similar materials. Resinols are very sensitive to heat and oxidation.

"Resinox."⁵⁸ TM for a series of phenolic resins, supplied in various forms suitable for applications as bonding agents for shell molding and as core binders for metal casting; impregnants or bonding materials for grinding wheels, brake linings, insulation, and similar industrial uses; as pipe linings, air conditioning equipment coatings, special primers; as laminating, bonding, impregnating resins for paper, fibers; for use in cans, drums, and tank car linings requiring a high degree of chemical and solvent resistance; and for

heavy duty products, such as equipment housings. Special formulations for high temperature use of space technology.

resin, synthetic. A man-made high polymer resulting from a chemical reaction between two (or more) substances, usually with heat or a catalyst. This definition includes synthetic rubbers and silicones (elastomers), but excludes modified, water-soluble polymers (often called resins). Distinction should be made between a synthetic resin and a plastic, the former is the polymer itself, whereas the latter is the polymer plus such additives as fillers, colorant, plasticizers, etc.

The first truly synthetic resin was developed by Baekeland in 1911 (phenol-formaldehyde). This was soon followed by a petroleum-derived product called coumarone-indene, which did indeed have the properties of a resin. The first synthetic elastomer was polychloroprene (1931) originated by Nieuwland, and later called neoprene. Since then many new types of synthetic polymers have been synthesized, perhaps the most sophisticated of which are nylon and its congeners (polyamides, by Carothers) and the inorganic silicone group (Kipping). Other important types are alkyds, acrylics, aminoplasts, polyvinyl halides, polyester, epoxies, and polyolefins.

In addition to their many applications in plastics, textiles and paints, special types of synthetic resins are useful as ion-exchange media.

See "Cumar." See also plastic, paint, fiber, film, elastomer.

Note: Because the term "resin" is so broadly used as to be almost meaningless, it would be desirable to restrict its application to natural, organo-soluble, hydrocarbon-based products derived from trees and shrubs. But in view of the tendency of inappropriate terminology to "gel" irreversibly, it seems like a losing battle to attempt to replace "synthetic resin" with the more precise "synthetic polymer."

See also note under gum, natural.

resist. A material which will prevent the fixation of dye on a fiber, thus making color designs and pattern prints possible. The resist may act mechanically, as a wax, resin, or gel which prevents absorption of the dye, or its accompanying mordant. Citric acid, oxalic acid, and various alkalies are among the more common resists of the chemical type.

resistor composition. A specially treated semiconducting metal powder compounded with glass binders and temporary organic carriers. Can be applied to glass or ceramic surfaces by stenciling, spraying, brushing or dipping; firing range 704-760C. Compositions can be blended with mem-